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# मानक

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IS 8134 (1996): Intermediate super abrasion furnace (ISAF)  
carbon black [PCD 13: Rubber and Rubber Products]



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“Knowledge is such a treasure which cannot be stolen”



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मध्यवर्ती उच्च अपधर्षण भट्टी (म. उ. अ. भ.)  
कार्बन कालिस — विशिष्टि  
( दूसरा पुनरीक्षण )

*Indian Standard*

INTERMEDIATE SUPER ABRASION  
FURNACE (ISAF) CARBON BLACK —  
SPECIFICATION

*( Second Revision )*

ICS 83.040.20

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**BUREAU OF INDIAN STANDARDS**  
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NEW DELHI 110002

## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1976. This was revised in 1986. In this revision, Industry Reference Black (IRB) No. 6 has been included as reference black instead of IRB No. 5 for measuring physical properties of the vulcanizate.

This standard contains clauses 4.2 and 4.4 which call for agreement between the purchaser and the supplier.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

**AMENDMENT NO. 1 APRIL 2003**  
**TO**  
**IS 8134 : 1996 INTERMEDIATE SUPER ABRASION**  
**FURNACE (ISAF) CARBON BLACK**  
**— SPECIFICATION**  
*( Second Revision )*

( Title, cover page 1 and page 1 ) — Substitute '(ISAF) N220' for '(ISAF)' and wherever appears.

( Page 1, clause 4.4, line 4 ) — Substitute 'IRB No. 7' for 'IRB No. 6'.

( Page 2, clause A-1, lines 5 and 6 ) — Substitute 'Industry Reference Black No. 7' for 'Industry Reference Black No. 6'.

( Page 3, clause A-2 ) — Substitute 'Carbon black (ISAF) N220' for 'Carbon black (ISAF)'.

( Page 3, clause A-4, line 1 ) — Substitute '30 minutes' for '15 and 30 minutes'.

( Page 3, clause A-6, line 3 ) — Substitute 'IRB No. 7' for 'IRB No. 6'.

( Page 3, Table 2 ) — Substitute the following for the existing:

**Table 2 Difference in Physical Properties of Vulcanizates Containing ISAF Carbon Black IRB No. 7**

Sl No.	Grade	Cure Condition	Tensile Strength, Min (MPa*)	300 Percent Modulus (MPa*)
(1)	(2)	(3)	(4)	(5)
i)	ISAF-HM (N 220)	30 min at 145°C	-3.1	-3.35 to -0.95
ii)	ISAF-LM (N 231)	30 min at 145°C	-2.3	-5.35 to -2.95
iii)	ISAF-LS (N 219)	30 min at 145°C	-1.9	-6.65 to -4.25

\*1 MPa = approximately 10.2 kgf/cm<sup>2</sup>.

# Indian Standard

## INTERMEDIATE SUPER ABRASION FURNACE (ISAF) CARBON BLACK — SPECIFICATION

( *Second Revision* )

### 1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for intermediate super abrasion furnace (ISAF) carbon black for use in rubber industry.

### 2 NORMATIVE REFERENCE

The following Indian Standards contain provision which through reference in this text, constitute provisions of this standard. At the time of publication the edition indicated were valid. All standards are subject to revision, and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No</i>	<i>Title</i>
1070 : 1992	Reagent grade water — Specification ( <i>third revision</i> )
1675 : 1971	Stearic acid, technical ( <i>first revision</i> ) (Amendment 1)
3399 : 1993	Zinc oxide for rubber industry ( <i>second revision</i> )
3400(Part 1) : 1987	Methods of test for vulcanized rubber: Part 1 Tensile stress-strain properties ( <i>second revision</i> )
4588 : 1986	Rubber, raw, natural ( <i>third revision</i> )
7498 : 1985	Method of sampling and test for carbon black ( <i>first revision</i> )
8483 : 1989	Dibenzothiazyl disulphide ( <i>first revision</i> )
8851 : 1994	Sulphur for rubber industry ( <i>first revision</i> )

### 3 GRADES

Three grades of intermediate super abrasion furnace carbon black have been covered by this specification which are designated as follows:

- a) ISAF-HM Intermediate super abrasion furnace — High modulus — Carbon black (N 220),

- b) ISAF-LM Intermediate super abrasion furnace — Low modulus — Carbon black (N 231), and
- c) ISAF-LS Intermediate super abrasion furnace — Low structure — Carbon black (N 219).

### 4 REQUIREMENTS

**4.1** The material shall be free from foreign matter and any visible impurities

#### 4.2 Pelletization

The material shall be delivered in pelletized form. Pellet hardness shall be controlled to such a degree that satisfactory dispersion is obtained on its being compounded using standard mixing equipments as desired by the purchaser.

#### 4.2.1 Pellet Size Distribution

Pellet size distribution shall be subject to agreement between the purchaser and the supplier

**4.3** The material shall also comply with the requirements given in Table 1

#### 4.4 Compounding

If desired by the purchaser, the material shall be compounded in natural rubber test recipe following the procedure given in Annex A and the properties of carbon black assessed relative to IRB No. 6

### 5 PACKING AND MARKING

#### 5.1 Packing

The material shall be supplied in paper bags. The net mass of each bag shall be  $25.0 \pm 0.5$  kg. The bags shall be shaped to facilitate stacking of pellets

#### 5.2 Marking

**5.2.1** Each package shall be clearly and indelibly marked with the following.

- a) Name of the material,
- b) Name of manufacturer,
- c) Net mass of material,
- d) Grade identification,

**Table 1 Requirement for Intermediate Super Abrasion Furnace (ISAF) Carbon Black**  
(Clauses 4.3 and 7.1)

SI No.	Characteristic	Requirement			Method of Test in IS 7498 : 1995 (Ref to Cl No.)
		ISAF-HM (N 220)	ISAF-LM (N 231)	ISAF-LS <sup>1</sup> (N 219)	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Iodine adsorption, mg of iodine/g of carbon black	116 to 126	117 to 127	112 to 122	5
ii)	Dibutyl phthalate absorption, ml/100 g of carbon black	109 to 119	87 to 97	73 to 83	6
iii)	Pour density, g/l	330 to 380	380 to 430	410 to 460	7
iv)	Sieve residue, percent by mass, <i>Max</i>				8
	a) On 45-micron IS Sieve	0 100 0	0 100 0	0 100 0	
	b) On 500-micron IS Sieve	0 001 0	0 001 0	0 001 0	
v)	Loss on heating, percent by mass, <i>Max</i>	2.5	2.5	2.5	9
vi)	Ash content, percent by mass, <i>Max</i>	1.0	1.0	1.0	10
vii)	Staining tendency	Non staining			12
viii)	Fines content, percent by mass, <i>Max</i>	15.0	15.0	15.0	13
ix)	Discoloration of toluene, percent transmission, <i>Min</i>	80	80	80	16

e) Shall have appropriate colour code identification, in Table 1 shall be tested on individual samples.

f) Batch or lot number, and

g) Month and year of manufacture.

### 6.3 Criteria for Conformity

The lot shall be declared as conforming to the requirements of the specification if all the test results of each of the individual samples satisfy the corresponding requirements.

### 5.2.2 BIS Certification Marking

The package may also be marked with the Standard Mark.

5.2.3 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

## 7 TEST METHODS

7.1 Test shall be conducted according to the method prescribed in Annex A and col 6 of Table 1.

### 7.2 Quality of the Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070 : 1992) shall be employed in the tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

## 6 SAMPLING

6.1 The sampling of carbon black shall be done in accordance with 2 of IS 7498 : 1985

### 6.2 Number of Tests

All the characteristics of ISAF carbon black given

## ANNEX A

(Clause 4.4)

### SCHEDULE FOR COMPOUNDING AND TESTING FOR PHYSICAL EVALUATION OF CARBON BLACK

#### A-1 GENERAL

This procedure involves the incorporation of the black to be tested in rubber along with necessary auxiliary agents, to permit vulcanization, followed by testing. Along with each test black, a cor-

responding stock containing the Industry Reference Black No. 6 is included. The difference between the properties obtained on the reference black is simply a device to cancel the inevitable variations in test results which are due to minor



variations between laboratories in equipment, materials, procedure and ambient conditions.

## A-2 STANDARD FORMULA

The standard formula for testing carbon black is given below:

<i>Material</i>	<i>Parts by Mass</i>
Natural rubber grade ISNR : 5 (conforming to IS 4588 : 1986)	100
Zinc oxide (conforming to IS 3399 : 1973)	5
Stearic acid (conforming to IS 1675 : 1971)	3
Dibenzothiazyl disulphide (conforming to IS 8483 : 1989)	0.6
Sulphur (conforming to IS 8851 : 1978)	2.5
Carbon black (ISAF)	50

## A-3 MIXING METHOD

**A-3.1** The method of mixing is given in A-3.1.1 to A-3.1.10.

**A-3.1.1** Use a two roll laboratory mill having 150 mm outside diameter and 250 to 280 mm working distance between the guides, and friction ratio 1.4 to 1. Adjust and maintain roll temperature at  $70 \pm 5^\circ\text{C}$  and set mill opening at 1.4 mm.

**A-3.1.2** The carbon black shall be conditioned before weighing by heating in an oven at  $105 \pm 5^\circ\text{C}$  for 1 hour.

**A-3.1.3** Weigh the ingredients for a batch size which is 4 times of the parts by mass in given in A-2.

**A-3.1.4** Add rubber on the mill and band (time 2.0 minutes).

**A-3.1.5** Add stearic acid and 3/4th cut twice each way (time 2.5 minutes).

**A-3.1.6** Set mill opening 1.65 mm. Add zinc oxide, sulphur and accelerator and 3/4th cut twice each way (time 2 minutes).

**A-3.1.7** Add carbon black. Open mill gradually to maintain approximately constant bank. 3/4th cut three times each way after all black is incorporated (time 7.5 minutes). Add carbon from the mill pan until all the black is incorporated.

**A-3.1.8** Cut stock, roll and weigh (time 1 minute). If the mass of the mixed batch is beyond the tolerance of  $\pm 0.5$  percent of the total mass of all ingredients, reject the batch.

**A-3.1.9** Pass end-wise six times at 0.8 mm opening, the sheet off at 2.2 mm finished gauge (time 2.5 minutes), cool on metal table top, and prepare specimen for cure.

**A-3.1.10** Condition the stock for 1 to 24 hours at  $27 \pm 2^\circ\text{C}$  and cut out suitable slabs for vulcanization.

## A-4 VULCANIZATION

The test pieces are vulcanized for 15 and 30 minutes at  $145^\circ\text{C}$  in a standard 4 cavity mould which gives sheets of dimensions  $150 \times 150 \times 2$  mm. The curing press shall be capable of exerting a minimum pressure of  $3.5 \text{ MN/m}^2$  (approx  $35 \text{ kgf/cm}^2$ ) on the cavity areas of the mould during vulcanization. After vulcanization, the sheets shall be cooled immediately in water. Condition the vulcanized test slab for 16 hours at  $27 \pm 2^\circ\text{C}$  before testing.

## A-5 TESTING

The vulcanized sheets are tested for 300 percent modulus and tensile strength in accordance with IS 3400 (Part 1) : 1987.

## A-6 PHYSICAL PROPERTIES

The difference in physical properties of vulcanizates containing ISAF carbon black as compared to IRB No. 6 shall be as given in Table 2.

**Table 2 Difference in Physical Properties of Vulcanizates Containing ISAF Carbon Black From IRB No. 6**

SI No.	Grade	Cure Condition	Tensile Strength, <i>Min</i> MPa* (4)	300 Percent Modulus MPa* (5)
(1)	(2)	(3)		
i)	ISAF-HM (N 220)	15 min at $145^\circ\text{C}$ 30 min at $145^\circ\text{C}$	- 2.0 - 1.6	- 0.8 to + 1.6 - 0.2 to + 2.2
ii)	ISAF-LM (N 231)	15 min at $145^\circ\text{C}$ 30 min at $145^\circ\text{C}$	- 1.4 - 0.8	- 2.8 to - 0.4 - 2.2 to + 0.2
iii)	ISAF-LS (N 219)	15 min at $145^\circ\text{C}$ 30 min at $145^\circ\text{C}$	- 0.9 - 0.4	- 3.6 to - 1.2 - 3.5 to - 1.1

\*1 MPa =  $10.2 \text{ kgf/cm}^2$  approx

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Additions'.

This Indian Standard has been developed from Doc : No. PCD 13 ( 1299 ).

### Amendments Issued Since Publication

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